

PATENT SPECIFICATION



Date of Application and filing Complete

Specification: Oct. 18, 1955.

Application made in Switzerland on Oct. 18, 1954.

Complete Specification Published: Oct. 16, 1957.

784,661

No. 29687/55.

Index at acceptance:—Classes 83(2), A155; and 83(4), V2

International Classification:—B21h, B23p.

COMPLETE SPECIFICATION

Process for the Production of Austenitic Springs for Watches, and Like Apparatus, and Springs Obtained by this Process

We, INSTITUT DR. ING. REINHARD STRAUMANN A.G., a Swiss Corporation of Waldenburg, Basle-Campagne, Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

In applicants' British Patent No. 735,510 there is described a process for the production of alloys in strip form suitable for conversion into watch springs and the like, which comprises homogenising at high temperature and quenching wire made from an alloy, which exhibits a cubic face-centred or a cubic body-centred crystal lattice, drawing, preferably in the cold state, the quenched wire to a diameter such that a reduction in cross-section of between 60 and 85% is obtained and then, after such decrease in cross-section, rolling the wire to produce a flat strip and a total decrease in cross-section of substantially 90%, based on the original cross-section, the direction of highest modulus of elasticity in the flat strip becoming oriented substantially parallel to the direction of rolling, the final strip being preferably heat-treated at a temperature of between 200° and 600°C. for not more than 24 hours. In this way a modulus of elasticity of at least 21.00 kg/mm² can be obtained. The spring strips produced from a cubic face-centred material according to the method described in the said Patent No. 733,510 show a definite predominance of direction 111, i.e., orientation of direction 111 of the texture parallel to the direction of rolling, whereby maximum values of the modulus of elasticity and of tensile strength are obtained. But such strips showing predominance of the direction 111 parallel to the direction of rolling have so far only been achieved by working from wire to the strip, whilst it has up to now not been possible to produce, starting from broad bands having a rectangular cross-section,

rolled spring strips which show a predominance of direction 111 of the texture parallel to the direction of rolling and parallel to the rolling plane. Austenitic spring strips hitherto produced by cutting out the spring strips from broad strips in the longitudinal direction, i.e., the direction of rolling of such broad strips—further show inferior elastic properties to strips rolled from wire.

It has been observed by X-ray examinations of textures that, when subjecting a metal band or strip of rectangular cross-section which has previously been homogenised and which consists of an austenitic or cubic face-centred material to a rolling operation, a strong predominance of direction 111 transversely to the direction of rolling, i.e., at an angle of 90° to the direction of rolling can be achieved, whilst in the spring strips produced from wire in accordance with the above mentioned patent the direction 111 is situated in the direction of rolling.

The main object of the present invention is therefore a process for the production of austenitic springs for watches, and the like apparatus, wherein a band of austenitic cubic face-centred metallic material having a rectangular cross-section, is homogenised and subsequently rolled to a broad band until a degree of deformation of at least 80% is reached and a definite predominance of direction 111 in the direction transverse to the direction of rolling has been achieved, the spring strips are cut out from the rolled metal strip in a direction transverse to the direction of rolling, so that the direction 111 lies along their longitudinal axis, and the spring strips are subjected to a heat-treatment at temperatures ranging from 200° to 600°C.

The choice of a material with rectangular cross-section can naturally also be based on bar or rod shaped material, which has been given a rectangular cross-section by crushing or pressing in any suitable way.

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in this way, austenitic springs of superior quality for watches and like spring driven or controlled apparatus are obtained. This process is especially suitable for the production of main springs, brake springs, etc., for watches. It is—due to the present invention—possible to roll strips, from which springs for watches may be cut, to a width of approximately 50 cm. Spring strips for watch springs, which were cut transversely to the direction of rolling from such a broad austenitic band, showed a definite predominance of direction 111 in the direction of their length, i.e., transversely to the original direction of rolling. Tests have, as expected, shown that the modulus of elasticity of so-obtained spring strips in a longitudinal direction is just as high as that of the spring strips produced from a metal wire according to British Patent No. 733,510.

It has also been observed that every austenitic alloy is suitable for the process according to the invention—for example, austenitic non-rusting steels, 18/8 chromium-nickel steels for instance, which do not change from an austenitic structure to a ferritic structure during cold rolling, or age-hardenable austenitic alloys based on Cr-Co-Fe or Ni-Fe-Cr with the known additions. The invention should therefore not be limited in any way to certain austenitic alloys, as any austenitic alloy can be used with the same success for the purpose of the invention.

It is essential that the composition of the alloy is chosen in such a way and the heat

treatment, i.e., the homogenisation, is carried out in such a way that the formation of texture is not rendered difficult or even impossible by a change in structure or by segregation which may occur in the course of the production of the broad rolled strip.

What we claim is:—

1. Process for the production of austenitic springs for watches, and the like apparatus, wherein a band of an austenitic cubic face-centred material having a rectangular cross-section, is homogenised and subsequently rolled to a broad metal band, until a degree of deformation of at least 80% has been reached and a definite predominance of direction 111 in the direction transverse to the direction of rolling has been achieved; the spring strips are cut out from the rolled metal strip in a direction transverse to the direction of rolling, so that the direction 111 lies parallel to their longitudinal axis and are then subjected to a heat-treatment at temperatures ranging from 200° to 600°C.

2. Austenitic springs for watches and the like apparatus, characterised by the fact that they are produced by the process of Claim 1 from a metal band and show a definite predominance of direction 111 in the direction of their length and transversely to the direction of rolling.

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